REMARKS

The Examiner is thanked for the comments in the Action. They have helped us considerably in understanding the rationale therein and in drafting this Response thereto.

It is our understanding that claims 1-28 remain pending in this application. Claims 1, 2, 6, 7, 11, 12, 16-20, 25 and 28 have been amended for reasons remarked upon, below. No new subject matter is added by these amendments.

Drawings:

The Action states, *"The drawings are objected to because the Figure Number for the figure including Tables 1-3 has been omitted."* Respectfully, while we feel that there is no basis for this objection under the applicable statutes, rules, or procedures of the Office, in a responsive spirit we herein amended the case accordingly. A mark-up copy of the sheet containing TABLES 1-3 is provide herewith to show the change made, and a new formal drawings is provided herewith as well.

Claim Objections (sub-points 1-3):

We thank the Examiner for noting our improper use acronyms and verbose words such as "able" and "potential". Claims 1, 2, 6, 7, 11, 12, 16-20, 25 and 28 are herein amended accordingly. In some instances we have made additional amendments to provide clarity. We urge that these are straightforward and in spirit with the points raised in the Action. For example, claim 2 has been amended to remove clearly improper grammar, yet in a manner that remains fully supported by the specification.

Claim Rejections (35 USC §112):

Claims 1-28 are rejected under §112, ¶2, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Specifically, the Action here states, *"The scope of the invention is difficult to determine because it is unclear how many addresses applicant is claiming and what relationship exists between the plurality of addresses."* Respectively, this is error. Applicant is not claiming any

addresses and the relationship between the singular address value that the claimed invention provides, and the sub-address elements that are used to create this in some situations, is completely and unambiguously recited in the claims.

Since the Action quotes claim 1, please consider it now for the sake of example, using the copy herein and the line numbers therewith (and it may help to also review FIG. 8 and 9b). What is claimed in claim 1 is a *"circuit to search an external memory containing search results based on a search value received from an external controller"* (ln. 1-2). As those of ordinary skill in this art are aware, such a circuit (often termed a "search engine") takes a search value and provides an address to a search result in the external memory. Accordingly, the circuit of claim 1 employs a logic unit (ln. 11) to create and provide such *"an address value"* (ln. 12).

Specifically, this *"address value"* is created based on either a CAM output (ln. 12) – OR – a hash output (ln. 16). In the latter case, as an intermediate to the end result of creating the *"address value,"* the hash output is first used to create *"one or more hash addresses"* (ln. 16) that with a *"hash pointer value"* (ln. 17) are then used to create the *"address value."* Thus, the *"address value"* is what the circuit provides to the external memory and in some situations the circuit bases this on *"one or more hash addresses"* and a *"hash pointer value"*. A discussion of hash addresses and a hash pointer values is provided in the specification at pg. 9, ln. 9 through pg. 10, ln. 20, with further discussion appearing throughout the specification.

The Action further states, *"The scope of the invention is difficult to determine because it is unclear how many search values applicant is claiming and what relationship exists between the search values."* Respectfully, this is also error. Applicant is not claiming any search values and the relationship between a singular *"search value"* that the claimed invention uses when performing a search and a database of *"instances of search values known to cause hash collisions"* is completely and unambiguously recited in the claims.

Using claim 1 again for the sake of example, what is claimed in it is a *"circuit to search ... based on a search value"* (ln. 1-2). A *"hash unit [generates] a hash output based on the search value"* (ln. 3), wherein this search value would clearly be understood by one of ordinary skill in the art to be the search value just recited in ln. 1-2. A *"content addressable memory (CAM) unit [stores] a CAM database of instances of the search values known to cause hash collisions ... and to match the search value against said CAM database"* (ln. 6-8), wherein this would clearly be understood to one of ordinary skill in the art to recite a database (of search

values instances) that the current, singular "*search value*" (first recited in ln. 1-2) is matched against.

At ln. 20-27 a "*search data storage*" is recited, and close attention should be paid here to not confuse the "*search value*" first recited in ln. 1-2 with "*a plurality of search data values*" now recited at ln. 23. The "*search data values*" and the "*search value*" are not the same. At ln. 28 a "*comparator*" is recited, and this receives both the "*search value*" (first recited in ln. 1-2) and the "*search data values*" (first recited in line 23). In sum, the "*search value*" the "*search data values*" are completely and unambiguously recited in the claims.

The Action yet further states, "*Claim 1 recites 'thereby permitting the external memory to not store any instances of the search values.' The scope of the invention is difficult to determine because it is unclear whether the search values are being stored.*"

Respectfully, while we feel this is also error, we have herein amended the claims to avoid the confusion this has caused. The quoted and now deleted language was intended to emphasize a major benefit of the claimed invention that might not be readily apparent unless the   ; specification was read and fully grasped.

Accordingly, of the two points argued in the Action, we urge that we have shown that the first two are error and that the third is now moot. Consistent with the remarks just made, we have also amended independent claims 6, 11, 12, 20, 25, and 28.

Art Rejection:

We regret that no prior art is argued in the present Action. Otherwise, we understand that this is informational in nature and requires no reply..
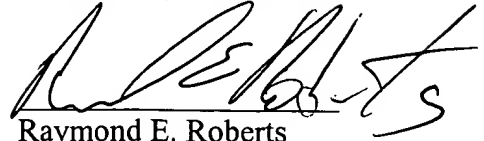
CONCLUSION

Applicant has endeavored to put this case into complete condition for allowance. It is thought that the claim objections and §112 rejections have all been corrected by amendment or shown to be unfounded. Applicant therefore asks that all objections and rejections now be withdrawn and that allowance of all claims presently in the case be granted.

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FIG. 16

	Hash-based approach (2-way-set-associative) Fig. 1	CAM-based approach Fig. 2	H-CAM-based approach (2-way-set-associative) Fig. 8
ASIC output pins	21	128	128
ASIC input pins	160	32	32
RAM size (est. cost)	2M x 160 ($800)	1M x 32 ($80)	1M x 32 ($80)
CAM size (est. cost)	-	1M x 128 ($3200)	100K x 128 ($320)
Hash Pointer RAM size (est. cost)	-	-	2M x 20 ($100)
Search Data RAM size (est. cost)	-	-	1M x 128 ($320)
Database size (entries) supported	Depends	1M	Depends
Associate content RAM read	2 reads per search	1 read per search	1 read per search
Estimated cost	$800	$3280	$820
Estimated Power consumption	20W	162W	28.5W

Table 1

	Search value (6-digit wide)	Hash 1 output (4-digit wide)	Hash 2 output (2-digit wide)	CAM 1 content	CAM 2 content	Memory content
1	-	-	-	-	-	-
2	324238	7783	63	-	-	-
3	-	-	-	-	-	63: 324238,17
4	578901	6311	63	-	-	63: 324238,17
5	-	-	-	-	100:6311	63: 324238,17 100: 578901,23
6	322413	6311	63	-	100:6311	63: 324238,17 100: 578901,23
7	-	-	-	200:322413	100:6311	63: 324238,17 100: 578901,23 200: - , 86
8	578901	6311	63	200:322413	100:6311	63: 324238,17 100: 578901,23 200: - , 86
9	322413	6311	63	200:322413	100:6311	63: 324238,17 100: 578901,23 200: - , 86
10	324238	7783	63	200:322413	100:6311	63: 324238,17 100: 578901,23 200: - , 86

Table 2

Memory Size and Bandwidth requirement		Old method (Fig. 1)	H-CAM (Fig. 11)
Memory size	Search Data memory	8 million entries	1 million entries
	Hash Pointer memory	none	2M pointers
	Total (Mbit)	1024	164
Memory bandwidth	Reads/search	8	2 per H-CAM

Table 3